

CLAIMS

1. Magnesium composite powder which is a starting raw material to manufacture a particle-dispersion type of magnesium group composite material by a solid-phase reaction synthesis, comprising:

 magnesium alloy coarse particles serving as a main component which constitutes a matrix of a magnesium alloy; and

 fine-grained powder comprising a component which reacts with magnesium to form a compound, and attached on a surface of said magnesium alloy coarse particle.

2. The magnesium composite powder according to claim 1, wherein said fine-grained powder comprises at least one kind of powder particles selected from a group consisting of silicon (Si), silica (SiO₂), γ alumina (Al₂O₃) and aluminum (Al).

3. The magnesium composite powder according to claim 1, wherein a particle diameter of said magnesium alloy coarse particle is 100 μ m to 5mm and a particle diameter of said fine-grained powder is not more than 100 μ m.

4. The magnesium composite powder according to claim 3, wherein a particle diameter of said magnesium alloy coarse particle is 500 μ m to 2mm and a particle diameter of said fine-grained powder is 0.5 μ m to 50 μ m.

5. The magnesium composite powder according to claim 1, wherein said fine-grained powder is attached on the surface of said magnesium alloy coarse particle through a binder.

6. The magnesium composite powder according to claim 1, wherein said fine-grained powder is attached on the surface of said magnesium alloy coarse particle through oil.

7. The magnesium composite powder according to claim 1, wherein said fine-grained powder and said magnesium alloy coarse particle are mechanically bonded.
8. A magnesium group composite material manufactured using the magnesium composite powder according to claim 1, wherein reaction products of said magnesium alloy coarse particle and said fine-grained powder are dispersed in a magnesium alloy matrix, and said reaction product comprises at least one kind of compound selected from a group consisting of Mg_2Si , MgO , Al_3Mg_2 , $Mg_{17}Al_{12}$ and $MgAl_2O_4$.
9. The magnesium group composite material according to claim 8, comprising graphite powder as a solid lubricant agent, wherein 0.5% to 3% by weight of the graphite powder is contained in the magnesium group composite material.
10. The magnesium group composite material according to claim 8, wherein 20% or less by weight of said reaction products is contained in said magnesium alloy matrix.
11. The magnesium group composite material according to claim 10, wherein 5% to 10% by weight of said reaction products is contained.
12. A manufacturing method of magnesium composite powder comprising:
 - a step of preparing magnesium alloy coarse particles;
 - a step of mixing fine-grained powder comprising a component which reacts with magnesium to form a compound, in a binder solution; and
 - a step of spraying said binder solution containing said fine-grained powder onto said magnesium alloy coarse particles and drying it.
13. A manufacturing method of a magnesium group composite material comprising:
 - a step of attaching fine-grained powder comprising a compound which

reacts with magnesium to form a compound, on a surface of a magnesium alloy coarse particle;

a step of pressing and solidifying magnesium composite powder in which the fine-grained powder is attached on the surface of said magnesium alloy coarse particle;

a step of heating a solidified body provided by said pressing and solidifying step in an inert gas atmosphere or a non-oxidizing gas atmosphere, and generating compound particles by solid-phase reaction synthesis of said magnesium alloy coarse particle and said fine-grained powder; and

a step of densifying the solidified body by performing a warm plasticity process on the solidified body which generated said compound particles.

14. The manufacturing method of the magnesium group composite material according to claim 13, wherein said warm plasticity process is an extrusion method in which an extrusion ratio is not less than 20.

15. The manufacturing method of the magnesium group composite material according to claim 14, wherein an extrusion ratio of said extrusion method is not less than 35.

16. The manufacturing method of the magnesium group composite material according to claim 13, wherein said compound particle comprises at least one kind of compound selected from a group consisting of Mg_2Si , MgO , Al_3Mg_2 , $Mg_{17}Al_{12}$ and $MgAl_2O_4$.

17. The manufacturing method of the magnesium group composite material according to claim 13, wherein said fine-grained powder is attached on the surface of said magnesium alloy coarse particle using a binder.

18. The manufacturing method of the magnesium group composite material according to claim 13, wherein said step of attaching said fine-grained powder comprises a step of mixing said fine-grained powder in a binder solution, and

a step of spraying said binder solution containing said fine-grained powder on said magnesium alloy coarse particle and drying it.

19. The manufacturing method of the magnesium group composite material according to claim 13, wherein said fine-grained powder is attached on the surface of said magnesium alloy coarse particle using oil.

20. The manufacturing method of the magnesium group composite material according to claim 19, comprising:

a step of charging said magnesium alloy coarse particle powder in a container;

a step of putting oil in said container and uniformly attaching oil on the surface of said magnesium alloy coarse particle powder by rotating, shaking and oscillating the container; and

a step of putting said fine-grained powder in said container and attaching said fine-grained powder on the surface of said magnesium alloy coarse particle powder through the oil by rotating, shaking and oscillating said container again.

21. The manufacturing method of the magnesium group composite material according to claim 20, wherein 0.2 to 1% by weight of said oil is added in said magnesium alloy coarse particle powder.

22. The manufacturing method of the magnesium group composite material according to claim 19, comprising:

a step of charging said magnesium alloy coarse particle powder in a container;

a step of putting oil and balls in said container and uniformly attaching oil on the surface of said magnesium alloy coarse particle powder by rotating, shaking and oscillating the container; and

a step of putting said fine-grained powder in said container and attaching said fine-grained powder on the surface of said magnesium alloy coarse particle powder through the oil by rotating, shaking and oscillating said container again.

23. The manufacturing method of the magnesium group composite material according to claim 19, wherein an evaporation temperature of said oil in an inert gas atmosphere or a non-oxidizing atmosphere is not more than 400°C.

24. The manufacturing method of the magnesium group composite material according to claim 13, wherein said fine-grained powder is mechanically bonded to the surface of said magnesium alloy coarse particle.